atile gases, hydrogen, helium, neon, argon, xenon, and krypton—we might thus occasionally interchange a molecule or two with Mars or Jupiter—but these interesting possibilities should not be heralded as the meteorology of the future. Meteorologists are not studying these finer but the ordinary grosser phenomena of the earth's atmosphere.

At the present time there is absolutely no evidence that the moon or planets have any appreciable influence on the earth, except the well-known ocean tides and the astronomical perturbations due to their gravitational attraction. Of course, they give us a little light in the night-time, but that would scarcely be spoken of as a powerful influence.

OSCILLATIONS OF THE LAKES AND THE CLIMATE IN ARID REGIONS.

The recent reports from Salt Lake City show that the great Salt Lake is now at a lower level than has previously been recorded, by nearly one foot. During the past three years the water available for keeping the lake up to its average height has been materially diminished, that is to say, there has been less rain and snow than the normal, and more sunshine and wind. Similar experiences are reported from India and the Pacific. Thus we learn from a contemporary newspaper that Lieut. O. Olufsen, of the Danish army, well known by his explorations in central Asia and on the Pamir Plateau, says that within the past few years the quantity of water in the streams and wells of Turkestan and Bokhara has notably diminished. This is particularly true of the Syr Daria and the Amu Daria. The Lake Yechil Kul has shrunk from a circumference of 120 miles to one of 40. A somewhat similar story comes from South Africa, where Lake Ngami has dried up greatly within the past ten years, and the natives have been obliged to retire from it.

All these observations do not indicate a permanent change in the condition of the atmosphere. These lakes have all gone through many similar dry periods before this, some of them have dried up very much since they were first formed, but these changes require immense geological epochs. The climatological pendulum swings to and fro very slowly. The annual variations of mean temperature, wind and rain, sunshine and evaporation are rapid and large but they oscillate about the same mean values that obtained a thousand years ago.

EROSION DUE TO HEAVY RAINS AND STEEP GRADES.

The study of physiography teaches us that most of the mountain ranges and hills are simply the outlasting harder portions of the soil and rocks that have not yet been worn down by the steady action of the rains, the frosts, and the rivers. The greatest amount of denudation has taken place in regions of heavy winter freezes and abundant spring and summer rains, but the deepest and most precipitous canyons occur in regions that have but little frost and only occasional but heavy local rains. In these regions a comparatively small watershed of very steep gradient carries a mass of water downward with such force as to do far more erosion and other damage than if the same rain were spread over a longer period of time. Perhaps this principle is well illustrated in the following extract from the Examiner of San Francisco, Cal., November 27. The account there given may be exaggerated, but in general terms it well presents the nature of a phenomenon which is frequently occurring in our arid regions.

On Tuesday, November 20, at Santa Cruz Island, there was a terrific rain. For several hours the water supply poured from the sky, the fall amounting to a cloudburst on the tops of the island mountains. From the harbor a long canyon or valley runs 6 miles up into the mountains, draining an immense watershed and having a fall of about 2,000 feet. A day or two of drizzling rain started the little creek, but it soon became a powerful torrent. Immense volumes of water rushed pell mell down the bed, washing brush, driftwood, and even trees out to sea. The noise was something frightful. It was a low, deep roar from the crashing together of great rocks.

The sloop lay a quarter of a mile off shore in water that was practically fresh. The debris from the island was all around her and the creek waters could be traced far past her. Captain Julius rowed ashore a day later. The beach had receded 100 feet from its former position. The canyon was cleared to bedrock of all movable things.

MIRAGE OVER LAKE MICHIGAN.

A beautiful mirage was witnessed at or near Chicago, Ill., on December 20, 1900, when the observers, looking eastward, saw perhaps 30 or 40 miles of distant lake shore elevated so as to become visible.

The view was elevated above the horizon and was enveloped in a pale blue light. It formed the lower lining of a maze of darkness that hung over the lake shortly after noon and was visible for more than an hour. It faded from view by slowly vanishing from both ends until nothing but the blackened smoke that had floated out from the city's smokestacks remained to be seen.

It appeared in view as slowly and as majestically as it vanished. There was a dark streak between it and the horizon. Prof. H. J. Cox says:

The atmospheric conditions were perfect for such a mirage; there was scarcely a breeze astir; the lake was smooth and the warm rays of the sun slanted down under the bank of smoke.

METEOROLOGY AT THE PARIS CONGRESS OF 1900.

In the Meteorologische Zeitschrift for November, 1900, the editor published a full account of the proceedings of the general Meteorological Congress called by the authorities of the International Exposition, and also of the permanent meteorological committee appointed by the International Congress of Meteorology and its subcommittees. Meteorologists from all parts of the world were in attendance on the congress, and its proceedings were quite interesting. Among the papers worthy of mention were those by Paulsen, on the spectrum of the aurora; Hildebrandsson, on the work of the cloud committee; Sprung, on automatic apparatus for measuring the height and velocity of the clouds; Edelstam, on actinometric measurements made by Angström and himself on Teneriffe with the new Angström pyrheliometer; Algue, on microseismic observations during storms.

In general, however, the attention of the congress was mainly given to the meteorology of the upper regions of the atmosphere. And this was right. The interest that every meteorologist must have in the knowledge of the processes going on in the upper strata of the air was stimulated most thoroughly, and the results described by the untiring and successful students in this field of research called forth, not only expressions of satisfaction and admiration, but gave occasion, even in wider circles, to the mature resolution to actively cooperate with those who have done the pioneer work in the exploration of the upper regions. All the meteorologists best known for their work with balloons and kites (Rotch, Teisserenc de Bort, Assmann, and Hergesell) communicated some account of their arrangements and results. A copy of the magnificent work, in three great volumes, Scientific Balloon Ascensions, by Assmann and Berson, was presented by Assmann. The newest extensions of meteorological services were presented in papers by Rona, on the work of Konkoly and the new Meteorological Observatory in O'Gyalla, Austria; by Nakamura, on the meteorological service of Japan; by Ballif, on the meteorological service in Bosnia and Herzegovina; Chaves, on the meteorological service of the Azores. Weather shooting or hail shooting was reported on for Italy, Hungary, and Austria, and it was agreed that this widespread craze must be utilized as a means of obtaining data for the study of hailstorms. No special subcommittees were appointed by the congress, but the subcommittees of the permanent committee seem to have acted as such, thereby giving rise to some confusion as to the spheres of these two distinct bodies.

In the session of the international subcommittee on aeronautics, the best methods of carrying on the exploration of the atmosphere with sounding balloons and kites were thoroughly discussed. Its conclusions were adopted by the international committee, which met on the afternoon of September 15, after the close of the congress and held its session in the room at the top of the Eifel Tower. Teisserenc de Bort obtained the best results with lacquered paper balloons of from 50 to 100 cubic meters in volume, and these were recommended by the subcommittee, which also recommended that all the self-registering apparatus carried by balloons and kites should be made according to the model of that made by Richard for use at Trappes.

The subcommittee on clouds listened to an interesting address by Poey on the classification of clouds; the cloud measurements in Russia were treated of by Rykatcheff, and those at Blue Hill by Rotch; an automatic telemeter for the measurement of cloud heights was described by Sprung.

The committee on solar radiation listened to Edelstam explain the construction and use of the new electric compensation pyrheliometer devised by Knut Angström, and the apparatus for the measurement of the general light of the sky devised by Dr. Onimus.

The subcommittee, on the improvement of the telegraph service, contended earnestly for the removal of the three or four hours' difference in European observations, but the difficulties in the way of accomplishing this were so great that it was decided to refer the subject to a committee consisting of official delegates representing the interested states.

Professor Mascart presided over the congress and subsequently over the permanent committee; Hildebrandsson was chosen as secretary of the committee.

The permanent committee adopted the two following resolutions:

1. The directors of meteorological institutions are invited to make observations on the movements of the clouds and, if possible, photogrammetric observations of their altitude and velocity on the days of international simultaneous balloon ascensions, which will be properly announced beforehand, in order that these observations may have the widest extension possible. It is also desirable that such observations shall be made on the day before and the day after the balloon ascensions.

2. The international meteorological committee requests its president, through his government officially, to bring about that the military aeronautic establishments of France and other countries, as well as the central meteorological institutes, be required by their governments to take part in the monthly international scientific balloon voyages. The next session of the international meteorological committee will be held in 1902 in London.

METEOROLOGY AND GEODESY.

The United States Coast and Geodetic Survey has recently published a volume containing Dr. Schott's report on the general results of the Transcontinental Triangulation and the American Arc of the Parallel. In its present shape this work was officially begun by Prof. Benjamin Peirce, the third superintendent of the Survey, while the completion of the work and of the volume marked the last year of the incumbency of Prof. H. S. Pritchett. It is only proper to add that for many years the senior assistant of the Survey, the Nestor and educator of American geodesists, Mr. C. A. Schott, has been guiding the work of the Survey in this direction. There are many matters in which geodesy and meteorology have a common interest, and the Weather Bureau is perhaps equally interested in the proper prosecution of the work of the Coast and Geodetic Survey, the Hydrographic Office of the United States Navy, the topographic and hydrographic work of the United States Geological Survey, and the instrumental work of the proposed Government bureau of standards. In examining this last great volume on triangulation a number of items have attracted our attention which it will be profitable for all to consider who are interested in meteorology.

The general object of geodesy is to determine first the general size and shape of the earth and distribution of the apparent force of gravity, and then their irregular deviations. But these are the very figures that lie at the base of all meteorology. It is true that the meteorologist has provisionally assumed a spherical globe and the distribution of gravity that belongs to a homogeneous ellipsoid of revolution, but the accurate work of the Coast Survey will show us to what extent these assumptions deviate from nature, whence we may judge what effects such deviations will have in meteorology. For instance, in the American Meteorological Journal, May, 1894, Vol. XI, page 1, the Editor has endeavored to show that the observed abnormal variations of gravity along a parallel of latitude from Washington to San Francisco are of the same order of importance as the viscosity or internal friction of the air, consequently the variations in gravity must be considered in any investigation that takes into account viscosity as contributing to the resistance which we call friction. Both must be considered or both neglected together. The most important friction terms in meteorology are those that arise from the resistance of the land as compared with the ocean, or of mountains and waves as compared with smooth surfaces, and an equally important source of resistance, which for brevity the Editor has called convectional friction, arises from the fact that ascending and descending currents, as they intermingle, resist each other's horizontal motion, because one of them, usually the ascending current, has a decidedly slower motion than the other, or perhaps even a movement in the opposite direction. The general rise of the barometer up to its maximum at 10 a. m. seems to be explained by the fact that a part of the greater kinetic energy of the swifter currents that descend to take the place of rising air is transformed into pressure or potential energy, both because its horizontal component must push the lower air along faster than it was previously going, and because its vertical descending component is resisted by the earth. Whenever a rapidly moving fluid gives up a part of its momentum to a more slowly moving fluid or solid an increased elastic pressure is produced within both fluid masses, similar to the resisting pressure at the head of a rapidly moving projectile. For velocities less than that of sound, and for changes of pressure and velocity that are produced almost adiabatically, the new pressure and volume P_1 and V_1 are connected with the initial P_0 and V_0 by the equation

$$P_1/P_0 = (V_0/V_1)^{1.407}.$$

The second part of Dr. Schott's report is devoted to the determination of the heights of the stations above mean sea level. The foundation of this work is a continuous line of spirit levels of the highest degree of accuracy, extending from Sandy Hook, N. J., on the Atlantic coast and tidewater on the Gulf coast to the eastern flank of the Rocky Mountains at Colorado Springs, Colo., thence by triangulation westward to the Sierra Nevada, and thence by levels to the Pacific Ocean. The middle portion of this line will eventually be replaced by continuous leveling, a rather tedious operation, over the Rocky Mountain Plateau, but essential in consideration of its practical applications. The results published in Part II deal more directly with the primary triangulation stations whose approximate elevations are needed for the computation of the length of the arc of the parallel. A short table is given showing that the new determinations differ by quantities as large as −355 and +242 feet from the older determinations of altitude. The elevation of the Weather Bureau station on the summit of Pikes Peak is reduced from